

SPECIAL OBSERVATIONS.

SOLAR AND SKY RADIATION MEASUREMENTS DURING OCTOBER, 1919.

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For a description of instrumental exposures, and an account of the methods of obtaining and reducing the measurements, the reader is referred to the REVIEW for January, 1919, 47:4.

The monthly means and departures from normal in Table 1 show that radiation measurements averaged below October normal values at Washington and Lincoln, where the month was an unusually cloudy one, and slightly above normal at Madison and Santa Fe.

TABLE 1.—*Solar radiation intensities during October, 1919.*

[Gram-calories per minute per square centimeter of normal surface.]

Washington, D. C.

Date.	Sun's zenith distance.									
	0.0°	48.3°	60.0°	66.5°	70.7°	73.6°	75.7°	77.4°	78.7°	79.8°
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
A. M.										
Oct. 3.....	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
7.....		1.12	1.01	0.90	0.81	0.74	0.65	0.59	0.51	0.43
8.....			1.14	1.03	0.92	0.83	0.75	0.70	0.63	0.55
11.....					1.01	0.91				
20.....			1.14	1.05	0.96	0.89	0.75	0.66	0.58	0.53
28.....			1.15	1.01	0.89	0.79	0.72	0.62	0.55	0.50
Monthly means.....			1.21	1.18	1.13	1.06	1.01	0.96	0.91	0.85
Departure from 11-year normal.....		1.16	1.08	0.98	0.91	0.84	0.75	0.74	0.69	(0.66)
Oct. 3.....	-0.06	-0.03	-0.04	-0.01	-0.02	-0.06	-0.04	-0.07	-0.07	-0.07
P. M.										
Oct. 3.....	1.12	0.98	0.90	0.79	0.70	0.64	0.58			
7.....	1.28	1.14	0.97							
13.....	1.25				0.79					
16.....										
18.....	1.21									
20.....	1.15	0.80								
27.....						0.62	0.59	0.57		
Monthly means.....		1.20	0.99	(0.94)	(0.86)	(0.74)	(0.63)	(0.58)	(0.57)	
Departure from 11-year normal.....		-0.03	-0.12	-0.08	-0.05	-0.09	-0.13	-0.13	-0.10	

Madison, Wis.

A. M.										
Oct. 6.....		1.31	1.29	1.23	1.17	1.11	1.04			
7.....	1.42	1.33	1.24	1.11	1.08	1.01	0.93			
8.....		1.06			0.81	0.77				
17.....	1.48	1.28	1.31	1.23	1.16	1.09	1.03	0.96	0.92	
22.....		1.14	1.07	1.06	1.01					
23.....		0.90								
29.....				1.12	1.02	0.94	0.86	0.79		
Monthly means.....		1.29	1.14	1.15	1.04	0.98	0.96	(0.88)	(0.92)	
Departure from 10-year normal.....		+0.03	-0.02	+0.04	±0.00	+0.02	+0.07	+0.11	+0.23	
P. M.										
Oct. 6.....		1.39	1.31	1.24	1.17	1.10				
7.....	1.22	1.15	1.08							
11.....		1.26	1.14	1.00	0.98					
17.....		1.18	1.11		1.04					
31.....										
Monthly means.....		(1.30)	1.22	1.14	1.07	(1.04)				
Departure from 10-year normal.....		-0.01	+0.05	+0.04	+0.06	+0.06				

¹ Extrapolated and reduced to mean solar distance.TABLE 1.—*Solar radiation intensities during October, 1919—Continued.*

[Gram-calories per minute per square centimeter of normal surface.]

Lincoln, Nebr.

Date.	Sun's zenith distance.									
	0.0°	48.3°	60.0°	66.5°	70.7°	73.6°	75.7°	77.4°	78.7°	79.8°
Air mass.										
A. M.										
Oct. 3.....	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
7.....		1.33	1.24	1.16						
11.....	1.52	1.40	1.27	1.17						
25.....		1.27	1.02							
29.....					1.16	1.06				
Monthly means.....	(1.36)	1.22	1.12	(1.03)	(0.94)	(0.78)				
Departure from 5-year normal.....	±0.00	-0.08	-0.10	-0.11	-0.12	-0.22				
P. M.										
Oct. 7.....	1.45	1.31	1.23	1.12	1.02	0.94	0.87	0.80	0.74	0.70
11.....		1.24	1.13	1.05	0.97	0.90				
22.....		1.13	1.04	0.96	0.87	0.82				
28.....		1.32	1.22	1.13	1.07	1.02				
Monthly means.....	(1.31)	1.23	1.13	1.04	0.96	0.90	(0.80)	(0.83)	(0.70)	
Departure from 5-year normal.....	-0.05	-0.02	-0.02	-0.04	-0.06	-0.06	-0.10	-0.03	-0.12	

Santa Fe, N. Mex.

A. M.										
Oct. 21.....								1.28	1.22	
29.....								1.19	1.13	1.07
30.....								1.24		
31.....								1.16	1.10	
Monthly means.....								1.23	(1.20)	(1.12)
Departure from 7-year normal.....								+0.04	+0.04	-0.01
P. M.										
Oct. 3.....		1.54	1.51							
10.....				1.33	1.29	1.18				
17.....				1.34						
21.....	1.62	1.52	1.46	1.36	1.30	1.18	1.15			
22.....						1.25	1.17	1.09		
28.....						1.27	1.23	1.19	1.15	
Monthly means.....	(1.53)	(1.48)	1.34	1.28	1.19	1.14	(1.15)			
Departure from 3-year normal.....	+0.06	+0.09	+0.03	+0.04	+0.03	+0.04	+0.13			

¹ Extrapolated and reduced to mean solar distance.

Table 3 shows a deficiency of radiation at all three stations, amounting to 21 per cent of the October normal at Washington, 19 per cent at Lincoln, and 13 per cent at Madison.

The skylight polarization measurements made at Washington on 4 days give a mean of 55 per cent, with a maximum of 63 per cent on the 28th. At Madison, measurements made on 7 days give a mean of 66 per cent, with a maximum of 71 per cent on the 6th. These are average values for October for Madison, but are below the average for Washington.

TABLE 2.—*Vapor pressures at pyrheliometric stations on days when solar radiation intensities were measured.*

Washington, D. C.			Madison, Wis.			Lincoln, Nebr.			Santa Fe, N. Mex.		
Date	8 a.m.	8 p.m.	Date	8 a.m.	8 p.m.	Date	8 a.m.	8 p.m.	Date	8 a.m.	8 p.m.
1919.	mm.	mm.	1919.	mm.	mm.	1919.	mm.	mm.	1919.	mm.	mm.
Oct. 3	15.11	16.79	Oct. 6	7.29	8.81	Oct. 3	12.68	17.37	Oct. 3	3.81	4.57
7	9.14	11.35	7	6.50	6.76	7	6.76	7.57	10	4.57	4.57
8	3.81	8.48	8	7.29	9.83	11	3.81	5.16	17	4.75	4.75
11	14.60	15.65	11	3.30	4.37	22	5.56	9.47	21	1.96	1.96
13	5.16	7.57	17	3.99	4.57	28	2.36	3.30	22	2.87	2.49
16	18.20	14.60	22	5.16	7.04	29	2.74	6.02	28	3.00	3.00
18	5.58	8.18	23	6.76	9.14				29	3.45	3.45
20	5.36	8.48	29	3.45	4.95				30	5.79	3.00
27	14.10	18.79	31	10.59	4.57				31	3.99	2.36
28	16.20	7.57									

TABLE 3.—*Daily totals and departures of solar and sky radiation during October, 1919.*

Day of month.	Daily totals.						Departures from normal.			Excess or deficiency since first of month.			
	Wash- ington.	Madi- son.	Lin- coln.	Wash- ington.		Madi- son.	Lin- coln.	Wash- ington.	Madi- son.	Lin- coln.	Wash- ington.	Madi- son.	Lin- coln.
				cal.	cal.	cal.	cal.						
1.....	77	73	300	-256	-213	-64	-256	213	-64	-405	344	9	
2.....	180	152	433	-149	-131	73	-149	131	73	-338	491	13	
3.....	365	133	361	69	-147	-4	69	-147	-4	-363	673	215	
4.....	296	94	125	-27	-182	-228	-27	182	228	-453	840	137	
5.....	230	106	92	-90	-167	78	-90	167	78	-571	701	41	
6.....	199	408	441	-118	139	96	-118	139	96	-468	586	78	
7.....	416	380	460	103	115	119	103	115	119	-368	491	203	
8.....	410	356	55	100	95	-281	100	95	-281	-535	484	157	
9.....	140	264	375	-167	7	46	-167	7	46	-496	479	115	
10.....	342	257	369	39	5	42	39	5	42	-308	42	257	
11.....	331	369	484	31	121	161	465	358	46	-714	244	138	
12.....	48	358	410	-249	114	92	-617	257	80	-507	455	514	
13.....	390	227	96	97	-13	-218	-224	-205	-205	-350	350	285	
14.....	66	143	104	-224	93	-205	-811	350	350	-882	370	482	
15.....	221	124	75	-66	-108	-239	-907	-239	-239	-907	455	514	
16.....	310	317	332	25	88	32	-104	129	123	-986	211	359	
17.....	179	356	418	-104	-47	-23	-328	123	123	-939	245	336	
18.....	328	220	314	47	-4	-23	-327	123	123	-891	339	499	
19.....	327	125	48	-94	-163	-163	-363	121	121	-804	437	372	
20.....	363	121	409	87	-98	127	-308	42	42	-1,039	542	-1,387	
Decade departure.....										Gr. cal....	-6,842	-4,636	-4,293
										Per cent....	-6.0	4.2	3.4